What is claimed is:

1. A method for manufacturing a semiconductor device having a semiconductor substrate with a contact hole filled by an aluminum-containing thin film, comprising the steps of:

forming a silicon-containing thin film in a region having a predetermined area including the inner surface of the contact hole on the surface of the semiconductor substrate;

forming an aluminum-containing thin film on the surface of the semiconductor substrate on which the silicon-containing thin film is formed; and

heating the semiconductor substrate on which the aluminum-containing thin film is formed to such a temperature as to cause silicon to diffuse with respect to aluminum.

2. A method for manufacturing a semiconductor device as claimed in claim 1, wherein the step of forming an aluminum-containing thin film and the step of heating the semiconductor substrate are carried out simultaneously.

3. A method for manufacturing a semiconductor device as claimed in claim 1, wherein the step of heating the semiconductor substrate is carried out after completing the step of forming the aluminum

thin film.

4. A method for manufacturing a semiconductor device as claimed in claim 1, wherein the step of forming a silicon-containing thin film in the region having the predetermined area includes the steps of:

forming a silicon-containing thin film in a region larger than the predetermined area; and

removing the silicon-containing thin film so that the area of the silicon-containing thin film can become the abovementioned predetermined area.

5. A method for manufacturing a semiconductor device as claimed in claim 4, wherein the step of removing the silicon-containing thin film includes a step of removing the silicon-containing thin film using a mask having a predetermined pattern.

6. A method for manufacturing a semiconductor device as claimed in claim 4, wherein the step of removing the silicon-containing thin film includes a step of removing the silicon-containing thin film by etching.

7. A method for manufacturing a semiconductor device as claimed in claim 1, wherein the predetermined area is not more than 99% of the area of the aluminum-containing thin film formed in the step of forming the aluminum thin film.

8. A method for manufacturing a semiconductor device as claimed in claim 1, wherein the semiconductor substrate is provided with a plurality of cells each including the contact hole, and

the ratio of the amount of silicon contained in the silicon-containing thin film formed in the region having the predetermined area per unit cell to the amount of aluminum supplied to a unit cell in the step of forming the aluminum thin film is not less than 0.1% and not more than 2% by atomic ratio.

9. A method for manufacturing a semiconductor device as claimed in claim 1, wherein the step of heating the semiconductor substrate includes a step of heating the semiconductor substrate to 380℃ ~ 570℃.